

## 2019 Focused Solicitation

### Request for Proposals (RFP)

Issued: 2/1/2019

**White Paper Responses Due Date: March 1, 2019**

**Full Proposals Due Date: April 15, 2019**

#### **1. SEMI-FlexTech Mission/Objectives**

SEMI-FlexTech is an industry-led, public/private partnership providing a common platform for flexible hybrid electronics (FHE) manufacturers/developers and their supplier base to develop the next generation of manufacturing equipment and materials. FlexTech's mission is to help develop the infrastructure required to support world-class manufacturing capability for FHE devices and products through a focused R&D program. FlexTech will oversee and administer funds provided by the U.S. Government through the Army Research Laboratory (ARL) for this purpose.

Topics in this 2019 Solicitation are:

- A. Reference designs for FHE sensor systems
- B. FHE Power
- C. Artificial Intelligence (AI) for additive manufacturing
- D. Mixed mode interconnect and metallization for FHE
- E. Human-Machine Interfaces (HMI)
- F. Open concepts for sensor and FHE technologies and agile, expedient manufacturing

Further detail about each topic is listed the section titled Proposal Topic Detail, below.

Concept demonstrations (demos) must be part of the deliverables for consideration of an award.

#### **2. Proposal Process and Topics**

The proposal process will start with a white paper submission. Members of the FlexTech technical council will review the white papers and recommend those for full proposal submission. Point of contact for the submission will be invited to submit a full proposal. Full proposals will be evaluated by members of the FlexTech technical council based on a set of criteria that include budget, collaboration value, criticality of the problem addressed, relevance to the FHE ecosystem, schedule & milestones, deliverables, and overall proposal quality. White paper and full proposal content requirements are listed in sections 6 and 7. Typical FlexTech programs run from 9-18 months including a final report. No information considered to be company proprietary should be divulged.

In soliciting these proposals, FlexTech plans to grant and administer funding which should be matched (50% of total project cost requested) with funds in the form of cash and in-kind contributions provided by the grant recipients to cover the total project cost. If all other criteria are equal, preference will be given to proposals with a higher percentage of cost share. It should be noted that, historically, cost share for the ARL/FlexTech development program has averaged over 60% industry funding. Project Teams of skilled

technical resources from FlexTech member companies will be identified to provide project oversight and direction. These Project Teams typically will be comprised of 2 to 4 experts from the consortium companies and members from the successful individual supplier or supplier team.

In responding to this solicitation, partnering among industrial companies or industrial company/ R&D organization/university teams is appropriate and in some cases encouraged. Individual company responses are appropriate where company size, breadth and expertise are sufficient to cover effectively all areas (e.g., technical resources, financial stability, and market presence) critical to the successful completion of the proposal.

FlexTech will support technical approaches that are revolutionary, thus having a more significant element of risk, as well as approaches that are evolutionary improvements upon existing capability, which tend to be less risky and involve shorter development and delivery intervals. It is recognized that it may be desirable to include information that is considered confidential and proprietary by the submitter in order to fully and effectively convey the technical merits of the proposal. While a best effort will be made to restrict the proposal information to those with a need to know expressly for purposes of the review, it is recommended that the inclusion of proprietary information be limited to the minimum necessary to convey the highlights of the technical approach.

With respect to intellectual property developed under a FlexTech contract, the following policy has been established to encourage suppliers to cooperate with FlexTech and ARL in the accomplishment of their objectives:

“Legal title to any technology developed under a FlexTech funded research and development contract will be the property of the development partner.”

Development agreements generally will be awarded on an actual cost basis, not-to exceed contracts, with payments to be made quarterly and based on milestones as presented in the proposal. If your company has a U.S. government approved rate structure, use it. If not, the normal commercial cost accounting system used for internal R&D projects will be acceptable. The methods used to value “cost sharing” cost must be the same as those used to value the full project costs. All suppliers are expected to have a government approved or industry standard accounting system by which actual project costs are tracked and reported. This is an absolute requirement to be sure that cost share obligations are met.

A work breakdown structure should be the basis of project schedules, milestone definitions, and cost estimates. Cost estimates for each major step leading to completion of a milestone should be used as the basis for the amount from the grant to be paid. A spreadsheet showing these calculations should accompany each proposal. The same spreadsheet should also show the specifics of how you will contribute your matching share of the total costs of the development contract. Cost sharing expectations have been established in the master agreement between FlexTech and ARL, and a minimum 50/50 cost sharing ratio between government and industry is required.

### **3. Research and Development Award Budget**

FlexTech prior solicitations have resulted in awards in the budgetary range of \$250k-\$500k, with an additional cost share from the award recipient matching or exceeding the cash award. Anticipation for this 2019 RFP solicitation is a cash budget range of \$250k - \$1M with an additional matching (or greater) cost

share from the award recipient. Proposals may be from single institutions or a project team comprised of various companies and/or universities. Proposals from multi-institutional teams will be preferred.

#### **4. Focused Solicitation**

In partnership with Army Research Labs, FlexTech is soliciting technology development proposals for the following areas:

Part A – Reference design for FHE sensor systems - The purpose of this focused solicitation is to fund a recipient, a single team or multiple recipients and teams to conduct a R&D effort to develop a demonstrate-able modular multi-disciplinary sensing system applicable to flexible, lightweight mobile, and /or curved constructions. This reference design or developers' platform should incorporate a number of sensors (printed, MEMS, others), physical interfaces, signal conditioning circuit, processing unit, and other functional blocks to enable multi-sensor integration as well as fusion algorithm development. Demonstration of the platform for one application is desired with applicability to additional FHE opportunities. Example FHE applications may be UAVs, medical wearables, or environmental applications. Given the mobile, lightweight requirements of these FHE systems, the integrated sensor platform should be able to be run on mobile power sources (batteries) or be self-powered and have output and communication capabilities that include wireless data transfer.

Part B – Power - The purpose of this focused solicitation is to fund a recipient, a single team or multiple recipients and teams to conduct a R&D effort to develop renewable, sustainable power systems for application to flexible hybrid electronics. Here power system solutions and demonstration of FHE integration is emphasized over single component development. FHE power system design, simulation, and optimization tools are also of interest as well as the development of ultra-low power circuits and components. Lightweight, flexible, efficient systems may include one or more energy harvesting transduction methods. Breakthrough materials applications for power delivery and management will be considered.

Part C – AI for Additive Manufacturing – The purpose of this focused solicitation is to fund a recipient, a single team or multiple recipients and teams to conduct a R&D effort to develop and demonstrate artificial intelligence or machine learning algorithms to manufacturing. Algorithms could be generally applicable to process development but for purposes of this initiative, applicable to processes typical of FHE and additive manufacturing. The interest is to apply machine learning techniques to process module optimization, process control, and final functional test outcome (yield) incorporating a broad selection of input parameters such material properties, process parameters, environmental conditions, etc. Data management, data transfer protocols, and data security solutions should be proposed.

Part D – Mixed mode interconnect and metallization for FHE - The purpose of this focused solicitation is to fund a recipient, a single team, or multiple recipients and teams to conduct an R&D effort to develop and demonstrate interconnect and metallization technologies for flexible hybrid electronics. Electrical connection and termination between hard and soft materials or rigid and compliant surfaces are challenging; a simple, reliable, and ruggedized solution is not currently available. Combined metallization and interconnect techniques may provide a solution. These solutions can incorporate but are not limited to physical vapor deposition, direct ink writing, electroless plating, adhesives, mechanical or electromagnetic fastening. Proposals must include demonstrators and reliability test data.

Part E – Human – machine interfaces – The purpose of this focused solicitation is to fund a recipient, a single team, or multiple recipients and teams to conduct an R&D effort to develop and demonstrate advanced and/or novel human machine interfaces (HMI.) HMI solutions can be hardware, software or a combination that enhance the dynamics of humans interacting with machines to improve operational efficiencies, augment human performance and capabilities, and accelerate information processing for making decisions, taking action, and enhancing safety. The emphasis of the HMI should be

- (a) Soft Robotics: Using highly compliant materials proposals should demonstrate functionality and path to manufacturability; full robotic systems and not just components are required. Soft robotics may be combined with rigid robots. Field of use is open (e.g. healthcare, biomimicry, manufacturing automation) and no specific applications are proscribed.
- (b) Biometric Security: Solutions can include identification (“who are you”) and/or authentication (“prove who you are.”) Multimodal biometric inputs (face, iris, fingerprint, voice), multi-factor authentication, encryption, behavioral and context-based authentication, and data compression and secure, traceable data transfer are of particular interest.

Part F – Open Concepts – Open concepts that build upon the topics of sensor and flexible hybrid electronics. This includes but it is not limited to devices, manufacturing protocols, embedded software, communication protocols, sensor fusion, and applications.

## **5. Requirements for Receiving an Award**

In order to submit a response to this FlexTech RFP and subsequently to be considered for an award, several requirements must be met as detailed below.

- To receive an award from FlexTech, the company or composite team of companies must have a significant presence in the United States in the form of R&D activities and/or manufacturing. At least 50% of the work activity (funds) must be spent within the U.S. operations. The primary company leading the proposal must be a U.S.-owned company. Further, for the period of award performance plus the 3 years following, the primary company plus all IP resulting from said award must remain under control of a U.S.-owned or majority-controlled company. In certain cases, where it can be demonstrated that the development is both critical to U.S. manufacturing capability and unique, this “preference for U.S. operations” requirement can be waived with ARL approval. Any responding company requiring such a waiver must make this known in the pre-proposal document.
- The company or companies must be committed to volume manufacturing of the developed products and provision to the U.S. FHE industry on a right-of-first acceptance basis. Applied research conducted by universities will be considered and does not need to meet this requirement. However, in this latter case a pathway to commercialization and or licensing must be envisioned and described.
- The company or companies, including universities, must provide a matching share of the development cost in cash and in-kind contributions (e.g., labor and materials) - 50% recommended.

- Companies and organizations which are selected for an award, including all partners and/or subcontractors, must subsequently join SEMI at the appropriate membership level. Membership information is available at <http://www1.semi.org/en/Membership/BecomeaMember>
- Companies and organizations which are selected for an award, including all partners and/or subcontractors, must agree to terms and conditions set forth in the SEMI FlexTech Development Agreement before receiving any portion of the award.

## **6. White Paper Instructions**

White paper submissions should be 5 pages (including any cover pages, tables of contents, figures, etc.) or less and contain a description of the proposed idea, high level budget, timeline, and background/experience of the R&D team. In addition, the submission should clearly outline the problem being addressed and how the proposed idea would solve the challenge. The current state of the art and the advancement the proposed idea has over that state of the art should be discussed. In addition, the value to the FHE ecosystem and potential path to commercialization should also be outlined. White paper submissions do not have to adhere to a specific format (other than maximum page length), but it may be useful to review the full proposal instructions in section 7 for suggested content.

White papers will only be accepted electronically up to 5:00 PM PT on the due date of March 1, 2019. Please submit your completed proposal via email to [RFP2019@semi.org](mailto:RFP2019@semi.org)

## **7. Full Proposal Instructions**

The format below will help us evaluate your proposal and ensure that the major topic areas are covered. A full proposal is typically 20 pages with a page limit of 35 pages.

Content: The proposal shall comply with the following content and structure.

Page 1: Cover Page

Date  
Project Title

Company Name  
Address

Project Leader Contact Information (telephone and email)  
Project Team (Prime & Subs)  
Project Duration

Total Project Cost  
Cost Share  
FlexTech Funds Requested

Page 2: Table of Contents

Page 3: Executive Summary, containing a short description of the project objective and industry or supply chain impact

Pages 4-35: Proposal Content

1. Project Proposal
  - 1.1. Problem definition
  - 1.2. Project scope and objectives
  - 1.3. Technical approach, rationale and innovative claims with supporting data and diagrams
  - 1.4. Performance target metrics and/or specifications
  - 1.5. Prior work, current status, and results (if any)
  
2. Statement of Work
  - 2.1. Project management approach
    - 2.1.1.Roles and relationships of key personnel and institutions
    - 2.1.2.Lead institution and subcontract partners
  - 2.2. Project schedule
  - 2.3. Detailed task description
  - 2.4. Milestones, deliverables including demonstration prototypes, reports, process definition, test results, reviews etc.
  
3. Detailed Project Cost and Cost Share by Task or by Quarter
  - 3.1. labor, materials, overhead, and capital
  
4. Project Risk Assessment
  - 4.1. Table: Analysis of Risk and Mitigation Strategy (list risk assessment tools/processes used if any)
 

Risk	Consequence	Mitigation Strategy	Impact (L,M,H)
  
5. Market Needs and Competitive Landscape
  - 5.1. Business justification
    - 5.1.1.Existing product portfolio
    - 5.1.2.Primary markets served and major customers
  - 5.2. Commercialization strategy for target markets
  - 5.3. Cost of ownership benefits of proposed technology in absolute terms or relative to the cost of the typical current process
  
6. Company Background and Capability to Meet Technical and Business Targets
  - 6.1. Team & key personnel
    - 6.1.1.Management and technical personnel experience and qualifications
  - 6.2. Facilities and equipment
  - 6.3. Relevant company information
    - 6.3.1.Three year financial performance track
    - 6.3.2.Staff size and make-up by function
    - 6.3.3.IP strategy, key previous innovative developments and intellectual property (patents) held related to the proposal topic
  
7. Contact Information for Technical Lead, Alternative Technical Representative, and Contract Representative

8. Appendix (if needed - NOT INCLUDED IN PAGE TOTAL)
- 8.1. Technical References
  - 8.2. Letters of Support

Full Proposals will only be accepted electronically up to 5:00 PM PDT on the due date of April 15, 2019. Please submit your completed proposal via email to [RFP2019@semi.org](mailto:RFP2019@semi.org)

## **8. Proposal Evaluation**

Upon receipt, proposals will be forwarded to the FlexTech Technical Council members for review. During the final selection process of proposals, some communication or negotiation between the potential supplier and representatives of FlexTech may be initiated over the terms, conditions, specifications, deliverables, schedule or other relevant factors contained in the proposal in advance of awarding of a contract. Granting of any awards to proposals submitted in response to this RFP is contingent upon the continued availability of funding from the U.S. Government.

## **9. 2019 RFP Schedule**

The tentative schedule of activities for the FLEXTECH 2019 RFP is as follows:

February 1, 2019	RFP Issued
February 8, 2019	Webinar
March 1, 2019	White Paper Due
March 18, 2019	Notification of White Paper Acceptance and Full Proposal Request Full
April 15, 2019	Proposals Due
June 1, 2019	Notification of Award (each full proposal point of contact will be notified)

RFP Schedule subject to change based on availability of review personnel, commitment of federal funds, and other factors.

## **10. Resources**

SEMI-FlexTech and DoD personnel will be available for consultation at the Flex2019 conference in Monterey, California February 18-21, 2019. A webinar will be held on February 8, 2019 to review white paper requirements and answer any questions from the public.

## **11. Current Members of the FlexTech Governing and Technical Councils**

Applied Materials	Cambridge Display Technology
DuPont Teijin Films	E Ink
EMD/Millipore	SEMI-FlexTech
Chasm Advanced Materials	Qualcomm
ThinFilm	US Army Research Laboratory
Molex	NextFlex

## **12. Contact Information**

Communication and questions during the proposal period should be directed to [RFP2019@semi.org](mailto:RFP2019@semi.org).